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PROGRESS REPORT
TO
OFFICE OF NAVAL RESEARCH

CONTRACT NO: N00014-86-C-0784

TITLE: Development of an Optical Feedback Based
High Accuracy Beam Transmissometer

ITEM NO: 0001AG

DATE: 14 February 1989

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Principal Investigator

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**PROGRESS REPORT: Development of Optical Feedback Based
High Accuracy Beam Transmissometer**

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INTRODUCTION

Work during this period has concentrated on the fabrication of the optical bridge components, specifically the implementation of the proposed light source and detector assembly. Significant progress has been made toward the development of a reliable package fabrication technique for the light source and detector assembly.

RESEARCH RESULTS

The integrated light source assembly consisting of the header, Siemen's blue LED and reference detector has been tested to determine if sufficient power output is available to obtain a signal to noise ratio of 60 DB. The reference detector current was 0.1 μ amps at an LED current of 100 millamps. This detector current is adequate to obtain the required signal to noise ratio but the LED current is higher than anticipated. The Cree blue LED is expected to solve this problem since it should have higher power output . This device is expected to be delivered soon. If in fact it does not have higher power output then a thermistor will be added to the integrated light source package to monitor the reference detector temperature allowing one to compensate for temperature effects.

Most of the effort during this period was expended in trying to package the LED and reference detector. The potting of the integrated device posed some difficult problems which are hopefully solved. As always air bubbles and impurities in the potting compound were the main problem. The air bubbles were removed in a vacuum and the impurities problem was solved by using a centrifuge.

CONTINUING WORK

Cree Research has fabricated custom blue LED's at a wavelength of 455 nm. Cree has not yet supplied these LED's to Sea Tech for evaluation. These prototype

chips have been evaluated by Cree, they emit at 455 nm and have approximately 30 nm full width at half maximum bandwidth. Cree has tested power output on some prototype devices. The photometric value was 1.5 millicandles at 20 millamps which is substantially higher than the Siemen's blue LED's.



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